Managing Common Bite Wounds and Their Complications in the United States

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KEYWORDS

• Bite wound infection • *Pasteurella* • *Eikenella* • Bite prophylaxis • Amoxicillin/clavulanic acid • Dog bite • Cat bite • Human bite

KEY POINTS

- Bite wounds are quite common in the United States, and have a high propensity for polymicrobial infection.
- Wound cultures in this setting can help narrow antibiotics by ruling out potential resistant organisms, but broad coverage of common aerobes and anaerobes is still necessary.
- Dog, cat, and human bites all have a tendency to occur on the upper extremities where there is limited overlying protective clothing and greater possibility of tendon and joint involvement.
- Antibiotic prophylaxis in uncomplicated, noninfected-appearing bite wounds has mixed data, but is recommended in multiple situations such as an immunocompromised patient.
- The need for rabies prophylaxis from domestic dog or cat bites in the United States is typically low, but varies by region and this should be evaluated on a case-by-case basis with help of local health departments.

INTRODUCTION

A patient is admitted to your service for an infected right hand bite wound that he sustained while attempting to pet his neighbor's new dog. He cleaned the wound thoroughly at home following the injury and applied some topical antibiotics. The next day his hand became significantly more red, swollen, and painful in the region of trauma. He also developed difficulty extending his index finger. Preliminary radiograph shows soft tissue swelling without foreign body. He is afebrile but has a mild leukocytosis to 13.2.

Clinicians in every setting will come across the often-complicated bite-related infection, and it is imperative to know the steps necessary to provide exceptional care for

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your patient. Working within the realm of infectious disease in this setting requires important critical thinking ability, but once learned can be mastered quite easily.

Throughout the course of this article, the focus is primarily on infected bites inflicted by the most common 3 sources: dogs, cats, and humans. The microbiology of each of these sources is discussed in detail, with special attention to the clinical manifestations of a typical bite-related infection along with potential complications depending on the depth and location of the wound, as well as individual host factors. The need for further evaluation including laboratory tests and diagnostics, and the treatment of the wound with any potential complication also is examined. Furthermore, it also is important to recognize and understand potential need for rabies vaccination in this unique context.

EPIDEMIOLOGY

Bite wounds in the United States have a modestly high incidence, with 1 study reporting nearly 1% of all emergency room visits being due to mammalian bites on an annual basis.[1] The most frequent cause is secondary to dogs in 85% to 90% of cases in the United States,[2] followed by cats accounting for 2% to 50% of cases,[3] and lastly humans. It has been estimated that 50% of Americans will suffer a bite wound at some point in their life, and it is well known that many bites are frequently unreported, as many of these are minor and the victims frequently do not seek any type of medical attention. In those that are reported, it is more common for a patient to have an underlying infection, especially when the patient presents more than 8 hours after the inciting injury.[4,5]

Each type of bite does have specific epidemiologic properties, including the most common genders affected, as well as the most common region of trauma. Nearly 4.5 million people are bitten by dogs yearly,[3] with children making up the most frequently bitten group.[2] Overall, there are approximately 10 to 20 bite-related deaths per year, with most of them being due to dogs.[2] Dog bites in children are typically localized to the head and neck, whereas in adults the extremities are the most frequent sites affected.[2] Cat bites are seen in the highest number in female individuals and are also most commonly involving the extremities.[2] Human bites are more common among young men, which are also found on the hands and extremities. Interestingly, most of these are occlusion bites (bites in which both the top and bottom jaws come together to cause the injury), with closed-fist injuries (the notorious “fight bite”) only accounting for 7.7% of them.[6]

MICROBIOLOGY

The microbiology underlying each of these sources of an infected bite wound is quite variable for multiple reasons. The most commonly found pathogens within each of these wounds often mimics those bacteria that inhabit the oral cavity of the biting organism. Less frequently, those bacteria that are colonizing the victim’s skin or those present in the surrounding environment can be potential pathogens.[7] One very important unifying detail about any wound of this nature is to remember that it is frequently polymicrobial, involving gram-positive, gram-negative, and anaerobic isolates.

With regard to dog and cat bites, the most frequently isolated species of bacteria is *Pasteurella*. Cat bites are found to be linked higher with *Pasteurella multocida,* whereas *Pasteurella canis* is the most common among dog bites. Other common aerobes typically found include streptococci, staphylococci*, Moraxella*, and *Neisseria.* Anaerobically, *Fusobacterium, Bacteroides, Porphyromonas*, and *Prevotella* can be seen, but 1 study[8] found that anaerobes were more common isolates if an abscess